

UNITED STATES PATENT AND TRADEMARK OFFICE GRANTED  
PATENT

6330755

December 18, 2001

Vacuum processing and operating method

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APPL-NO: 461432 (09)

FILED-DATE: December 16, 1999

GRANTED-DATE: December 18, 2001

PRIORITY: August 29, 1990 - 2-225321, Japan (JP)

ENGLISH-ABST:

This invention relates to a vacuum processing apparatus having vacuum processing chambers the insides of which must be dry cleaned, and to a method of operating such an apparatus. When the vacuum processing chambers are dry-cleaned, dummy substrates are transferred into the vacuum processing chamber by substrates conveyor means from dummy substrate storage means which is disposed in the air atmosphere together with storage means for storing substrates to be processed, and the inside of the vacuum processing chamber is dry-cleaned by generating a plasma. The dummy substrate is returned to the dummy substrate storage means after dry cleaning is completed. Accordingly, any specific mechanism for only the cleaning purpose is not necessary and the construction of the apparatus can be made simple. Furthermore, the dummy substrates used for dry cleaning and the substrates to be processed do not coexist, contamination of the substrates to be processed due to dust and remaining gas can be prevented and the production yield can be high.

Selected file: PLUSPAT

\*\* SS 1: Results 1

1 / 1 PLUSPAT - @QUESTEL-ORBIT  
PN - US6330755 B1 20011218 [US6330755]  
TI - (B1) Vacuum processing and operating method  
PA - (B1) HITACHI LTD (US)  
PAO - Hitachi, Ltd., Tokyo [JP]  
IN - (B1) TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP); KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP)  
AP - US46143299 19991216 [1999US-0461432]  
FD - Cont. of US177495 19981023 [1998US-0177495]  
Cont. of US061062 19980416 [1998US-0061062]  
Cont. of US882731 19970626 [1997US-0882731]  
Divsn of US593870 19960130 [1996US-0593870]  
Cont. of US443039 19950517 [1995US-0443039]  
Divsn of US302443 19940909 [1994US-0302443]  
Cont. of US096256 19930726 [1993US-0096256]  
Cont. of US751951 19910829 [1991US-0751951]  
Continuation of: US6012235  
Continuation of: US5950330  
Continuation of: US5784799  
Division of: US5661913  
Continuation of: US5553396  
Division of: US5457896  
Continuation of: US5349762  
Continuation of: US5314509  
PR - US46143299 19991216 [1999US-0461432]  
JP22532190 19900829 [1990JP-0225321]  
US17749598 19981023 [1998US-0177495]  
US6106298 19980416 [1998US-0061062]  
US88273197 19970626 [1997US-0882731]  
US59387096 19960130 [1996US-0593870]  
US44303995 19950517 [1995US-0443039]  
US30244394 19940909 [1994US-0302443]  
US9625693 19930726 [1993US-0096256]  
US75195191 19910829 [1991US-0751951]  
IC - (B1) F26B-005/04  
EC - C23C-014/56D  
H01L-021/00S2D4  
H01L-021/00S2Z  
H01L-021/00S6  
H01L-021/00S6B  
H01L-021/00S8B  
PCL - ORIGINAL (O) : 034406000  
DT - Corresponding document  
CT - US3652444; US3981791; US4138306; US4226897; US4311427; US4313783;  
US4313815; US4318767; US4449885; US4457661; US4534314; US4563240;  
US4576698; US4634331; US4643629; US4705951; US4715764; US4824309;  
US4836733; US4836905; US4851101; US4895107; US4902934; US4903937;  
US4909695; US4911597; US4915564; US4917556; US4923584; US4924890;  
US4936329; US4951601; US4969790; US5007981; US5014217; US5225036;  
US5292393; US5351415; US5436848; US5452166; US5462397; US5504033;  
US5504347; US5509771; US5556714; US5651858; US5675461; US5685684;  
US5829939; US5934856; EP20246453; EP20381338; JP57-29577;  
JP60-246635; JP62-44571; JP62-50463; JP62-89881; JP62-207866;  
JP63-153270; JP6412037; JP636582; JP131971; JP131970; JP1135015;  
JP1-251734; JP1-310553; JP1298180; JP2-61064; JP265252; JP294647;  
JP2-106037; JP430549; WO8707309  
R.P.H. Chang, "Multipurpose plasma reactor for materials research and processing", J. Vac. Sci. Technol., vol. 14, No. 1, Jan./Feb. 1977, pp. 278-280.

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Semiconductor Equipment Association of Japan, "Semiconductor News", vol. 4, pp. 38-43, Apr. 10, 1987 (w/translation).

STG - (B1) U.S. Patent (no pre-grant pub.) after Jan. 2, 2001  
AB - This invention relates to a vacuum processing apparatus having vacuum processing chambers the insides of which must be dry cleaned, and to a method of operating such an apparatus. When the vacuum processing chambers are dry-cleaned, dummy substrates are transferred into the vacuum processing chamber by substrates conveyor means from dummy substrate storage means which is disposed in the air atmosphere together with storage means for storing substrates to be processed, and the inside of the vacuum processing chamber is dry-cleaned by generating a plasma. The dummy substrate is returned to the dummy substrate storage means after dry cleaning is completed. Accordingly, any specific mechanism for only the cleaning purpose is not necessary and the construction of the apparatus can be made simple. Furthermore, the dummy substrates used for dry cleaning and the substrates to be processed do not coexist, contamination of the substrates to be processed due to dust and remaining gas can be prevented and the production yield can be high.  
UP - 2002-01

1 / 1 LGST - ©LEGSTAT  
PN - US 6330755 [US6330755]  
AP - US 461432/99 19991216 [1999US-0461432]  
DT - US-P  
ACT - 19991216 US/AE-A  
APPLICATION DATA (PATENT)  
US 461432/99 19991216 [1999US-0461432]  
  
20011218 US/BA  
PATENT (NO PREVIOUS PRE-GRANT PUBLICATION)  
  
20020604 US/RF  
REISSUE APPLICATION FILED  
20020206  
UP - 2002-24

1 / 1 CRXX - ©CLAIMS/RRX  
PN - 6,330,755 A 20011218 [US6330755]  
PA - Hitachi Ltd JP  
ACT - 20020206 REISSUE REQUESTED  
ISSUE DATE OF O.G.: 20020604  
REISSUE REQUEST NUMBER: 10/066747  
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Reissue Patent Number:

1 / 1 PAST - ©Thomson Derwent

AN - 200223-001864  
PN - 6330755 A [US6330755]  
OG - 2002-06-04  
ACT - REISSUE APPLICATION FILED

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S1	1	PN=US 6330755
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DIALOG(R)File 345:Inpadoc/Fam.& Legal Stat  
(c) 2003 EPO. All rts. reserv.

10473594  
Basic Patent (No,Kind,Date): EP 475604 A1 19920318 <No. of Patents: 080>

PATENT FAMILY:  
GERMANY (DE)

Patent (No,Kind,Date): DE 69128861 C0 19980312  
VAKUUMSBEHANDLUNGSVORRICHTUNG UND REINIGUNGSVERFAHREN DAFUER (German)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); TSUBONE TSUNEHICO (JP);  
NISHIHATA KOUJI (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): JP 90225321 A 19900829  
Applic (No,Kind,Date): DE 69128861 A 19910819  
IPC: \* H01L-021/00  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: German  
Patent (No,Kind,Date): DE 69128861 T2 19981008  
VAKUUMSBEHANDLUNGSVORRICHTUNG UND REINIGUNGSVERFAHREN DAFUER (German)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); TSUBONE TSUNEHICO (JP);  
NISHIHATA KOUJI (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): JP 90225321 A 19900829  
Applic (No,Kind,Date): DE 69128861 A 19910819  
IPC: \* H01L-021/00  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: German

EUROPEAN PATENT OFFICE (EP)

Patent (No,Kind,Date): EP 475604 A1 19920318  
VACUUM PROCESSING APPARATUS AND CLEANING METHOD THEREFOR (English;  
French; German)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); TSUBONE TSUNEHICO (JP);  
NISHIHATA KOUJI (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): JP 90225321 A 19900829  
Applic (No,Kind,Date): EP 91307625 A 19910819  
Designated States: (National) DE; FR; GB  
IPC: \* H01L-021/00  
Derwent WPI Acc No: ; G 92-090205  
Language of Document: English  
Patent (No,Kind,Date): EP 805481 A2 19971105  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English;  
French; German)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)

Priority (No,Kind,Date): EP 91307625 A3 19910819; JP 90225321 A 19900829  
 Applic (No,Kind,Date): EP 97111628 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00; C23C-014/56  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844; C 97-529274  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): EP 856875 A2 19980805  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English; French; German)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): EP 97111628 A3 19910819; JP 90225321 A 19900829  
 Applic (No,Kind,Date): EP 98106162 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844; G 98-401136  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): EP 1076354 A2 20010214  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English; French; German)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); TSUBONE TSUNEHICO (JP); NISHIHATA KOUJI (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): EP 97111628 A3 19910819; EP 91307625 A3 19910819; JP 90225321 A 19900829  
 Applic (No,Kind,Date): EP 2000121402 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): EP 1079418 A2 20010228  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English; French; German)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); TSUBONE TSUNEHICO (JP); NISHIHATA KOUJI (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): EP 97111628 A3 19910819; EP 91307625 A3 19910819; JP 90225321 A 19900829  
 Applic (No,Kind,Date): EP 2000121401 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844; G 02-107535  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): EP 805481 A3 19980520  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English; French; German)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): EP 91307625 A3 19910819; JP 90225321 A 19900829

Applic (No,Kind,Date): EP 97111628 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00; C23C-014/56  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): EP 856875 A3 19990428  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English; French; German)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): EP 97111628 A3 19910819; JP 90225321 A 19900829  
 Applic (No,Kind,Date): EP 98106162 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): EP 1076354 A3 20020807  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English; French; German)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); TSUBONE TSUNEHICO (JP); NISHIHATA KOUJI (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): EP 97111628 A3 19910819; EP 91307625 A3 19910819; JP 90225321 A 19900829  
 Applic (No,Kind,Date): EP 2000121402 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): EP 1079418 A3 20020807  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English; French; German)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); TSUBONE TSUNEHICO (JP); NISHIHATA KOUJI (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): EP 97111628 A3 19910819; EP 91307625 A3 19910819; JP 90225321 A 19900829  
 Applic (No,Kind,Date): EP 2000121401 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): EP 475604 B1 19980204  
 VACUUM PROCESSING APPARATUS AND CLEANING METHOD THEREFOR (English; French; German)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); TSUBONE TSUNEHICO (JP); NISHIHATA KOUJI (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): JP 90225321 A 19900829  
 Applic (No,Kind,Date): EP 91307625 A 19910819  
 Designated States: (National) DE; FR; GB  
 IPC: \* H01L-021/00

Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English

JAPAN (JP)

Patent (No,Kind,Date): JP 4108531 A2 19920409  
VACUUM TREATMENT APPARATUS (English)  
Patent Assignee: HITACHI LTD  
Author (Inventor): KATO SHIGEKAZU; NISHIHATA KOJI; TSUBONE TSUNEHICO;  
ITO ATSUSHI  
Priority (No,Kind,Date): JP 90225321 A 19900829  
Applic (No,Kind,Date): JP 90225321 A 19900829  
IPC: \* B01J-003/00  
JAPIO Reference No: ; 160351C000155  
Language of Document: Japanese  
Patent (No,Kind,Date): JP 4110169 A2 19920410  
IMAGE RECORDER (English)  
Patent Assignee: CANON KK  
Author (Inventor): SUZUKI AKIO  
Priority (No,Kind,Date): JP 90228396 A 19900831  
Applic (No,Kind,Date): JP 90228396 A 19900831  
IPC: \* B41J-002/365; B41J-002/36  
JAPIO Reference No: ; 160353M000093  
Language of Document: Japanese  
Patent (No,Kind,Date): JP 2644912 B2 19970825  
SHINKUSHORISOCHIOYOBISONONTENHOHO (English)  
Priority (No,Kind,Date): JP 90225321 A 19900829  
Applic (No,Kind,Date): JP 90225321 A 19900829  
IPC: \* B01J-003/00  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: Japanese  
Patent (No,Kind,Date): JP 2950950 B2 19990920  
Priority (No,Kind,Date): JP 90228396 A 19900831  
Applic (No,Kind,Date): JP 90228396 A 19900831  
IPC: \* B41J-002/01; B41J-002/36  
Derwent WPI Acc No: \* G 94-279094  
JAPIO Reference No: \* 160353M000093  
Language of Document: Japanese

KOREA, REPUBLIC (KR)

Patent (No,Kind,Date): KR 184682 B1 19990415  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): JP 90225321 A 19900829  
Applic (No,Kind,Date): KR 9114984 A 19910829  
IPC: \* H01L-021/304  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: Korean  
Patent (No,Kind,Date): KR 212819 B1 19990901  
TRANSFERRING SYSTEM AND VACUUM TREATING APPARATUS AND METHOD THEREBY  
(English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): NISHIHATA GOJI (JP); TSUBONE TSUNEHICO (JP); ITO  
ATSUSHI (JP)  
Priority (No,Kind,Date): JP 90225321 A 19900829; KR 9114984 A3



19910829

Applic (No,Kind,Date): KR 9846757 A 19981102

IPC: \* H01L-021/304

Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844

JAPIO Reference No: \* 160351C000155

Language of Document: Korean

Patent (No,Kind,Date): KR 212874 B1 19990901

TRANSFERRING SYSTEM AND VACUUM TREATING APPARATUS THEREBY (English)

Patent Assignee: HITACHI LTD (JP)

Author (Inventor): GATO SIGEGATSU (JP); NISHIHATA GOJI (JP); TSUBONE TSUNEHICO (JP); ITO ATSUSI (JP)

Priority (No,Kind,Date): JP 90225321 A 19900829; KR 9114984 A3 19910829

Applic (No,Kind,Date): KR 9846756 A 19981102

IPC: \* H01L-021/304

Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844

JAPIO Reference No: \* 160351C000155

Language of Document: Korean

#### UNITED STATES OF AMERICA (US)

Patent (No,Kind,Date): US 5314509 A 19940524

VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)

Patent Assignee: HITACHI LTD (JP)

Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)

Priority (No,Kind,Date): JP 90225321 A 19900829

Applic (No,Kind,Date): US 751951 A 19910829

National Class: \* 034406000; 034092000; 134902000; 414225000

IPC: \* B08B-003/00; C23C-016/00

Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844

JAPIO Reference No: \* 160351C000155

Language of Document: English

Patent (No,Kind,Date): US 5343231 A 19940830

IMAGE RECORDING APPARATUS CAPABLE OF CORRECTING DENSITY UNEVENNESS (English)

Patent Assignee: CANON KK (JP)

Author (Inventor): SUZUKI AKIO (JP)

Priority (No,Kind,Date): US 3992 A 19930115; JP 90228396 A 19900831; US 751952 B1 19910829

Applic (No,Kind,Date): US 3992 A 19930115

National Class: \* 347014000; 347015000

IPC: \* B41J-002/05

Derwent WPI Acc No: \* G 94-279094; G 94-279094

JAPIO Reference No: \* 160353M000093

Language of Document: English

Patent (No,Kind,Date): US 5349762 A 19940927

VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)

Patent Assignee: HITACHI LTD (JP)

Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)

Priority (No,Kind,Date): US 96256 A 19930726; JP 90225321 A 19900829; US 751951 A1 19910829

Applic (No,Kind,Date): US 96256 A 19930726

National Class: \* 034406000; 034092000

IPC: \* F26B-005/04

Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844

JAPIO Reference No: \* 160351C000155

Language of Document: English

Patent (No,Kind,Date): US 5457896 A 19951017  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 302443 A 19940909; JP 90225321 A  
 19900829; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 302443 A 19940909  
 Addnl Info: 5349762 Patented; 5314509 Patented  
 National Class: \* 034406000; 034092000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English

Patent (No,Kind,Date): US 5553396 A 19960910  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 443039 A 19950517; JP 90225321 A  
 19900829; US 302443 A3 19940909; US 96256 A1 19930726; US 751951  
 A1 19910829  
 Applic (No,Kind,Date): US 443039 A 19950517  
 Addnl Info: 5457896 Patented; 5349762 Patented; 5314509 Patented  
 National Class: \* 034406000; 034092000; 414225000; 134902000  
 IPC: \* B08B-003/00; C23C-016/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English

Patent (No,Kind,Date): US 5661913 A 19970902  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 593870 A 19960130; JP 90225321 A  
 19900829; US 443039 A1 19950517; US 302443 A3 19940909; US 96256  
 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 593870 A 19960130  
 Addnl Info: 5553396 Patented; 5457896 Patented; 5349762 Patented;  
 5314509 Patented  
 National Class: \* 034406000; 134902000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English

Patent (No,Kind,Date): US 5784799 A 19980728  
 VACUUM PROCESSING APPARATUS FOR SUBSTATE WAFERS (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 882731 A 19970626; JP 90225321 A  
 19900829; US 593870 A3 19960130; US 443039 A1 19950517; US 302443  
 A3 19940909; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 882731 A 19970626  
 Addnl Info: 5661913 Patented; 5553396 Patented; 5457896 Patented;  
 5349762 Patented; 5314509 Patented  
 National Class: \* 034092000; 414217000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G

02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 5950330 A 19990914  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 61062 A 19980416; JP 90225321 A  
 19900829; US 882731 A1 19970626; US 593870 A3 19960130; US 443039  
 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726; US  
 751951 A1 19910829  
 Applic (No,Kind,Date): US 61062 A 19980416  
 Addnl Info: 5784799 Patented; 5661913 Patented; 5553396 Patented;  
 5457896 Patented; 5349762 Patented; 5314509 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6012235 A 20000111  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 177495 A 19981023; JP 90225321 A  
 19900829; US 61062 A1 19980416; US 882731 A1 19970626; US 593870  
 A3 19960130; US 443039 A1 19950517; US 302443 A3 19940909; US  
 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 177495 A 19981023  
 Addnl Info: 5784799 Patented; 5661913 Patented; 5553396 Patented;  
 5457896 Patented; 5349762 Patented; 5314509 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6044576 A 20000404  
 VACUUM PROCESSING AND OPERATING METHOD USING A VACUUM CHAMBER (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 390684 A 19990907; JP 90225321 A  
 19900829; US 177495 A3 19981023; US 61062 A1 19980416; US 882731  
 A1 19970626; US 593870 A3 19960130; US 443039 A1 19950517; US  
 302443 A3 19940909; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 390684 A 19990907  
 Addnl Info: 5950330 Patented; 5784799 Patented; 5661913 Patented;  
 5553396 Patented; 5457896 Patented; 5349762 Patented; 5314509  
 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6055740 A 20000502  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);

TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 231451 A 19990115; JP 90225321 A  
 19900829; US 61062 A1 19980416; US 882731 A1 19970626; US 593870  
 A3 19960130; US 443039 A1 19950517; US 302443 A3 19940909; US  
 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 231451 A 19990115  
 Addnl Info: 5784799 Patented; 5661913 Patented; 5553396 Patented;  
 5457896 Patented; 5349762 Patented; 5314509 Patented  
 National Class: \* 034092000; 034228000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6070341 A 20000606  
 VACUUM PROCESSING AND OPERATING METHOD WITH WAFERS, SUBSTRATES AND/OR  
 SEMICONDUCTORS (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 390681 A 19990907; JP 90225321 A  
 19900829; US 177495 A3 19981023; US 61062 A1 19980416; US 882731  
 A1 19970626; US 593870 A3 19960130; US 443039 A1 19950517; US  
 302443 A3 19940909; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 390681 A 19990907  
 Addnl Info: 5950330 Patented; 5784799 Patented; 5661913 Patented;  
 5553396 Patented; 5457896 Patented; 5349762 Patented; 5314509  
 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6108929 A 20000829  
 VACUUM PROCESSING APPARATUS (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 461433 A 19991216; JP 90225321 A  
 19900829; US 231451 A1 19990115; US 61062 A1 19980416; US 882731  
 A1 19970626; US 593870 A3 19960130; US 443039 A1 19950517; US  
 302443 A3 19940909; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 461433 A 19991216  
 Addnl Info: 5950330 Patented; 5784799 Patented; 5661913 Patented;  
 5553396 Patented; 5457896 Patented; 5349762 Patented; 5314509  
 Patented  
 National Class: \* 034092000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6112431 A 20000905  
 VACUUM PROCESSING AND OPERATING METHOD (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 389461 A 19990903; JP 90225321 A  
 19900829; US 177495 A3 19981023; US 61062 A1 19980416; US 882731  
 A1 19970626; US 593870 A3 19960130; US 443039 A1 19950517; US  
 302443 A3 19940909; US 96256 A1 19930726; US 751951 A1 19910829

Applic (No,Kind,Date): US 389461 A 19990903  
 Addnl Info: 5950330 Patented; 5784799 Patented; 5661913 Patented;  
 5553396 Patented; 5457896 Patented; 5349762 Patented; 5314509  
 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010000048 AA 20010322  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 725257 A 20001129; JP 90225321 A  
 19900829; US 552572 A1 20000419; US 461432 B3 19991216; US 177495  
 A1 19981023; US 61062 A1 19980416; US 882731 A1 19970626; US  
 593870 A3 19960130; US 443039 A1 19950517; US 302443 A3  
 19940909; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 725257 A 20001129  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented; 5314509 Patented  
 National Class: \* 034092000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010001901 AA 20010531  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 766976 A 20010123; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 766976 A 20010123  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010001902 AA 20010531  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 767837 A 20010124; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726

; US 751952 B1 19910829; US 766587 A3 20010123  
 Applic (No,Kind,Date): US 767837 A 20010124  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010002517 AA 20010607  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 766975 A 20010123; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 766975 A 20010123  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010003873 AA 20010621  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 781296 A 20010213; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751951 A1 19910829; US 766587 A 20010123  
 Applic (No,Kind,Date): US 781296 A 20010213  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented; 5314509 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010004554 AA 20010621  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 766587 A 20010123; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US

443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 766587 A 20010123  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 438758000; 438907000  
IPC: \* H01L-021/31  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010004807 AA 20010628  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 780444 A 20010212; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 780444 A 20010212  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034406000; 034092000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010007175 AA 20010712  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 781298 A 20010213; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 781298 A 20010213  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034417000  
IPC: \* F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010008050 AA 20010719  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 781293 A 20010213; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062

A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 781293 A 20010213  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010008051 AA 20010719  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 781295 A 20010213; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 781295 A 20010213  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010008052 AA 20010719  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 781297 A 20010213; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751951 A1 19910829; US 766587 A3 20010123  
 Applic (No,Kind,Date): US 781297 A 20010213  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented; 5314509 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 20010009073 AA 20010726  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THERFOR (English)  
 Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
 TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 766597 A 20010123; JP 90225321 A



19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751951 A1 19910829  
Applic (No,Kind,Date): US 766597 A 20010123  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented; 5314509 Patented  
National Class: \* 034406000  
IPC: \* F26B-013/30; F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010009074 AA 20010726  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 781270 A 20010213; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 781270 A 20010213  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034406000  
IPC: \* F26B-013/30; F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010009075 AA 20010726  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 781452 A 20010213; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 781452 A 20010213  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034406000  
IPC: \* F26B-013/30; F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010009076 AA 20010726  
SUBSTRATE CHANGING-OVER MECHANISM IN A VACCUM TANK, COMPRISING  
(English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);

TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782194 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751951 A1 19910829  
Applic (No,Kind,Date): US 782194 A 20010214  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented; 5314509 Patented  
National Class: \* 034406000  
IPC: \* F26B-013/30; F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010010126 AA 20010802  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782193 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 782193 A 20010214  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034406000  
IPC: \* F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010011422 AA 20010809  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 781317 A 20010213; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751951 A1 19910829  
Applic (No,Kind,Date): US 781317 A 20010213  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented; 5314509 Patented  
National Class: \* 034092000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010011423 AA 20010809  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)

Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782197 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 782197 A 20010214  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034092000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010016990 AA 20010830  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782192 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751951 A1 19910829; US 766587 A3 20010123  
Applic (No,Kind,Date): US 782192 A 20010214  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented; 5314509 Patented  
National Class: \* 034406000  
IPC: \* F26B-013/30; F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010020339 AA 20010913  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 780394 A 20010212; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 780394 A 20010212  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034406000  
IPC: \* F26B-013/30; F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010020340 AA 20010913  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE

TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782196 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751951 A1 19910829; US 766587 A3 20010123  
Applic (No,Kind,Date): US 782196 A 20010214  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented; 5314509 Patented  
National Class: \* 034406000  
IPC: \* F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20010037585 AA 20011108  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 767834 A 20010124; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 767834 A 20010124  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034406000; 034092000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 20020032972 AA 20020321  
SUBSTRATE CHANGING-OVER MECHANISM IN VACUUM TANK (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782195 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829; US 766587 A3 20010123  
Applic (No,Kind,Date): US 782195 A 20010214  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034406000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6263588 BA 20010724  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)

Patent Assignee: HITACHI LTD (US)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 614770 A 20000712; JP 90225321 A  
19900829; US 552572 A3 20000419; US 461432 B3 19991216; US 177495  
A1 19981023; US 61062 A1 19980416; US 882731 A1 19970626; US  
593870 A3 19960130; US 443039 A1 19950517; US 302443 A3  
19940909; US 96256 A1 19930726; US 751951 A1 19910829  
Applic (No,Kind,Date): US 614770 A 20000712  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented; 5314509 Patented  
National Class: \* 034417000; 034229000  
IPC: \* F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6301801 BA 20011016  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE  
TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 552572 A 20000419; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751951 A1 19910829  
Applic (No,Kind,Date): US 552572 A 20000419  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented; 5314509 Patented  
National Class: \* 034406000; 034092000; 034228000  
IPC: \* F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6301802 BA 20011016  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: HITACHI LTD (US)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 765379 A 20010122; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 765379 A 20010122  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034406000; 034417000; 034092000; 034229000;  
118729000; 414744100; 414744600; 414939000; 414940000  
IPC: \* F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6330755 BA 20011218  
VACUUM PROCESSING AND OPERATING METHOD (English)

Patent Assignee: HITACHI LTD (US)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 461432 A 19991216; JP 90225321 A  
 19900829; US 177495 A1 19981023; US 61062 A1 19980416; US 882731  
 A1 19970626; US 593870 A3 19960130; US 443039 A1 19950517; US  
 302443 A3 19940909; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 461432 A 19991216  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented; 5314509 Patented  
 National Class: \* 034406000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6330756 BA 20011218  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (US)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 614764 A 20000712; JP 90225321 A  
 19900829; US 552572 A3 20000419; US 461432 B3 19991216; US 177495  
 A1 19981023; US 61062 A1 19980416; US 882731 A1 19970626; US  
 593870 A3 19960130; US 443039 A1 19950517; US 302443 A3  
 19940909; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 614764 A 20000712  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented; 5314509 Patented  
 National Class: \* 034406000; 034417000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6446353 BA 20020910  
 VACUUM PROCESSING APPARATUS (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 781270 A 20010213; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 781270 A 20010213  
 Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
 5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
 Patented; 5349762 Patented  
 National Class: \* 034092000; 034060000; 034236000; 414217000;  
 414222130; 414939000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6463676 BA 20021015  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);

TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 780427 A 20010212; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 780427 A 20010212  
 Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
 5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
 Patented; 5349762 Patented  
 National Class: \* 034412000; 034092000; 034218000; 134902000;  
 414217000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6314658 BB 20011113  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (US)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 725257 A 20001129; JP 90225321 A  
 19900829; US 552572 A1 20000419; US 461432 B3 19991216; US 177495  
 A1 19981023; US 61062 A1 19980416; US 882731 A1 19970626; US  
 593870 A3 19960130; US 443039 A1 19950517; US 302443 A3  
 19940909; US 96256 A1 19930726; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 725257 A 20001129  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented; 5314509 Patented  
 National Class: \* 034406000; 034092000; 414225000; 134902000  
 IPC: \* F26B-005/04; B08B-003/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6332280 BB 20011225  
 VACUUM PROCESSING APPARATUS (English)  
 Patent Assignee: HITACHI LTD (US)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 767834 A 20010124; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 767834 A 20010124  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented; 5314509 Patented  
 National Class: \* 034217000; 034092000; 034222000; 034225000;  
 034236000; 414939000; 414940000; 134902000; 156345000  
 IPC: \* F26B-019/00  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6339887 BB 20020122  
 VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);

TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 767837 A 20010124; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829; US 766587 A3 20010123  
 Applic (No,Kind,Date): US 767837 A 20010124  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented  
 National Class: \* 034406000; 034417000; 034092000; 034229000;  
 118729000; 414744600; 414939000; 414940000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6457253 BB 20021001  
 VACUUM PROCESSING APPARATUS (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 781317 A 20010213; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751951 A1 19910829  
 Applic (No,Kind,Date): US 781317 A 20010213  
 Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
 5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
 Patented; 5349762 Patented; 5314509 Patented  
 National Class: \* 034092000; 414217000; 134902000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6460270 BB 20021008  
 VACUUM PROCESSING APPARATUS (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 780394 A 20010212; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 780394 A 20010212  
 Addnl Info: 6330755 20000801 Patented; 6012235 Patented; 5950330  
 Patented; 5784799 Patented; 5661913 Patented; 5553396 Patented;  
 5457896 Patented; 5349762 Patented  
 National Class: \* 034092000; 134902000; 414217000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6463678 BB 20021015  
 SUBSTRATE CHANGING-OVER MECHANISM IN A VACCUM TANK (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)



Priority (No,Kind,Date): US 782194 A 20010214; JP 90225321 A 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726 ; US 751951 A1 19910829  
Applic (No,Kind,Date): US 782194 A 20010214  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented; 5661973 Patented; 5553396 Patented; 5457896 Patented; 5349762 Patented; 5314509 Patented  
National Class: \* 034573000; 034526000; 034527000; 034573000; 034209000; 034217000; 414217000; 414940000  
IPC: \* F26B-013/10  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6467186 BB 20021022  
TRANSFERRING DEVICE FOR A VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 766976 A 20010123; JP 90225321 A 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726 ; US 751952 B1 19910829  
Applic (No,Kind,Date): US 766976 A 20010123  
Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented; 5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762 Patented  
National Class: \* 034092000; 043060000; 043236000; 414217000; 414222130; 414939000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G 98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6467187 BB 20021022  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP); TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782192 A 20010214; JP 90225321 A 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726 ; US 751951 A1 19910829; US 766587 A3 20010123  
Applic (No,Kind,Date): US 782192 A 20010214  
Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented; 5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762 Patented  
National Class: \* 034092000; 034060000; 134085000; 134902000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6470596 BB 20021029  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);

TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 767837 A 20010124; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829; US 766587 A3 20010123  
 Applic (No,Kind,Date): US 767837 A 20010124  
 Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
 5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
 Patented  
 National Class: \* 034406000; 034417000; 034092000; 034229000;  
 118729000; 414744600; 414939000; 414940000  
 IPC: \* F26B-005/04  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6473989 BB 20021105  
 CONVEYING SYSTEM FOR A VACUUM PROCESSING APPARATUS (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 781297 A 20010213; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751951 A1 19910829; US 766587 A3 20010123  
 Applic (No,Kind,Date): US 781297 A 20010213  
 Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
 5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
 Patented; 5349762 Patented  
 National Class: \* 034092000; 034060000; 034236000; 414217000;  
 414222130; 414939000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6484414 BB 20021126  
 VACUUM PROCESSING APPARATUS (English)  
 Patent Assignee: HITACHI LTD (JP)  
 Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
 TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
 Priority (No,Kind,Date): US 781298 A 20010213; JP 90225321 A  
 19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
 A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
 443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
 ; US 751952 B1 19910829  
 Applic (No,Kind,Date): US 781298 A 20010213  
 Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
 5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
 Patented; 5349762 Patented  
 National Class: \* 034092000; 034060000; 034236000; 414217000;  
 414222130; 414939000  
 IPC: \* F26B-013/30  
 Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
 98-401136; G 02-107535; G 02-123844  
 JAPIO Reference No: \* 160351C000155  
 Language of Document: English  
 Patent (No,Kind,Date): US 6484415 BB 20021126  
 VACUUM PROCESSING APPARATUS (English)  
 Patent Assignee: HITACHI LTD (JP)

Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782193 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 782193 A 20010214  
Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
Patented; 5349762 Patented  
National Class: \* 034092000; 034060000; 034236000; 414222130;  
414217000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6487791 BB 20021203  
VACUUM PROCESSING APPARATUS (English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782196 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751951 A1 19910829; US 766587 A3 20010123  
Applic (No,Kind,Date): US 782196 A 20010214  
Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
Patented; 5349762 Patented  
National Class: \* 034217000; 034092000; 034222000; 034225000;  
034236000; 134902000; 414939000; 414940000; 156345000  
IPC: \* F26B-019/00  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 98-401136; G  
02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6487793 BB 20021203  
VACUUM PROCESSING APPARATUS AND OPERATING METHOD THEREFOR (English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 766587 A 20010123; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 766587 A 20010123  
Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
Patented; 5349762 Patented  
National Class: \* 034412000; 034406000; 034418000; 034500000;  
034092000; 034218000; 134902000; 414939000; 414222130  
IPC: \* F26B-005/04  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6487794 BB 20021203  
SUBSTRATE CHANGING-OVER MECHANISM IN VACUUM TANK (English)

Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782195 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829; US 766587 A3 20010123  
Applic (No,Kind,Date): US 782195 A 20010214  
Addnl Info: 6330755 Patented; 6012235 Patented; 5950330 Patented;  
5784799 Patented; 5661913 Patented; 5553396 Patented; 5457896  
Patented; 5349762 Patented  
National Class: \* 034573000; 034526000; 034527000; 034209000;  
034217000; 414217000; 414939000; 414940000  
IPC: \* F26B-013/10  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6490810 BB 20021210  
VACUUM PROCESSING APPARATUS (English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 782197 A 20010214; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
Applic (No,Kind,Date): US 782197 A 20010214  
Addnl Info: 6012235 Patented; 5950330 Patented; 5784799 Patented;  
5661913 Patented; 5553396 Patented; 5457896 Patented; 5349762  
Patented  
National Class: \* 034092000; 414225000; 134902000  
IPC: \* F26B-013/30  
Derwent WPI Acc No: \* C 97-529274; G 92-090205; G 94-279094; G  
98-401136; G 02-107535; G 02-123844  
JAPIO Reference No: \* 160351C000155  
Language of Document: English  
Patent (No,Kind,Date): US 6499229 BB 20021231  
VACUUM PROCESSING APPARATUS (English)  
Patent Assignee: HITACHI LTD (JP)  
Author (Inventor): KATO SHIGEKAZU (JP); NISHIHATA KOUJI (JP);  
TSUBONE TSUNEHICO (JP); ITOU ATSUSHI (JP)  
Priority (No,Kind,Date): US 781293 A 20010213; JP 90225321 A  
19900829; US 461432 A3 19991216; US 177495 A1 19981023; US 61062  
A1 19980416; US 882731 A1 19970626; US 593870 A3 19960130; US  
443039 A1 19950517; US 302443 A3 19940909; US 96256 A1 19930726  
; US 751952 B1 19910829  
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